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The Magellan Venus Mapping Mission: Science Operations

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The Magellan mission is in the final stages of completing data observations, data processing, data distribution to the science community, and analysis of the Magellan data set. The Magellan science objectives are to provide a global characterization of land forms and tectonic features; to distinguish and understand impact processes; to define and explain erosion, deposition, and chemical processes; and, to model the interior density distribution. After four complete 243 day cycles, Magellan has returned image, altimetry, and radiometry data covering 98% of the surface of Venus, a land area nearly four times the area of dry land on Earth. Image resolution is 120 m to 300 m. Altimetry footprints vary from a few Km to ten Km. Additionally, global gravity coverage has been obtained, greatly improving knowledge of the gravity field in the near equatorial regions of Venus near periapsis. The Magellan orbit was approximately 300 Km by 8000 Km in the first three cycles. Periapsis was lowered on Sept. 14, 1992, to 180 km for the fourth cycle gravity tracking. Gravity field resolution from spacecraft tracking is approximately equal to the spacecraft height above the surface. Magellan has provided pivotal advances in our understanding of Earth's sister planet, Volcanism is demonstrated as the dominant process. Tectonic deformation is pervasive over large regions of the planet. Surface processes include massive landslides and ubiquitous wind streaks that indicate predominate surface wind patterns. Impact crater distribution and morphology is providing essential clues to the geologic evolution of the. planet. The balance of the mission, following the completion of Cycle 3 on September 14, 1992, is devoted to collecting gravity data in the form of two-way X-band Doppler data recorded at the Deep Space Network stations. In late May 1993, a series of orbit maneuver's lowered periapsis to approximately 140 Km to begin an aerobraking experiment that will circularize the orbit to the range of 200 Km to 600 Km. In the first weeks of the experiment, drag has lowered the 8500 km periapsis by approximately 100 km per day. Circularization is expected to take about 70 days. Pending NASA approval, high resolution global gravity tracking data will be obtained, Global high resolution gravity will allow geophysical modeling of the global mantle convection patterns for better understanding of the interior of Venus and Earth-size planets in general.